

Advisory Circular

Subject: Requirements for Airspace Structures and Flight Procedures

Date: 12 January 2022

For the attention of: Air Navigation Service Providers

1. Purpose:

This advisory circular (AC) provides guidance to Air Navigation Service Providers (ANSPs) the requirements on the establishment of airspace structures and flights procedures in the Kingdom of Thailand. The primary audience of this AC is Air Traffic Services (ATS) Providers and Instrument Flight Procedure Design (IFPD) Service Providers in Thailand who are the key stakeholders in the establishment of airspace structures, ATS routes and flight procedures in Thailand. The secondary audience is the Aeronautical Information Service (AIS) Provider who is responsible for the promulgation of airspace structures, ATS routes and flight procedures in Thailand.

ANSPs may elect to use guidance in this AC or an alternative method provided the method is approved by the CAAT. In this AC, terms such as “shall” denote compliance and are the only means authorized when applying this AC. This AC does not change, add, or delete regulatory requirements or authorize deviations from regulatory requirements.

2. RELEVANT SECTIONS OF AIR NAVIGATION SERVICE REGULATIONS OR EQUIVALENT

CAAT-ANS-MOSATS

CAAT-ANS-MOSIFPD

CAAT-ANS-MOSAIS

3. RELATED DOCUMENTS

- ICAO Annex 2 Rules of the Air;
- ICAO Annex 11 Air Traffic Services;
- ICAO Annex 14 Aerodrome Volume I Aerodrome Design and Operations;
- ICAO Doc 4444 Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM);
- ICAO Doc 8168 Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) Volume II - Construction of Visual and Instrument Flight Procedures;
- ICAO Doc 9426 Air Traffic Services Planning Manual;
- ICAO Doc 9613 Performance-based Navigation (PBN) Manual;
- ICAO Doc 9689 Manual on Airspace Planning Methodology for the Determination of separation Minima;
- ICAO Doc 9992 Manual on the Use of Performance-Based Navigation (PBN) in Airspace Design.
- ICAO Codes and Route Designators (ICARD) Five-Letter Name-Codes Guidelines;

Air Navigation Service Standard Department

REQUIREMENTS FOR AIRSPACE STRUCTURES AND FLIGHT PROCEDURES

SECTION I

Specifications for flight information regions, control areas and control zones

(a) FLIGHT INFORMATION REGIONS

Flight information regions shall:

- (1) be delineated to cover the whole of the air route structure to be served by such regions; and
- (2) include all airspace within its horizontal limits, except when limited by an upper flight information region.

Notes on FLIGHT INFORMATION REGIONS:

- (a) Whenever possible, a flight information region should be identified by the name of the unit having jurisdiction over such airspace.
- (b) Where it is desirable to limit the number of flight information regions through which high flying aircraft would otherwise have to operate, a flight information region should be delineated to include the upper airspace within the lateral limits of a number of lower flight information regions.
- (c) When limited by an upper flight information region, the lower limit specified for the upper flight information region should constitute the upper vertical limit of the flight information region and should coincide with a VFR cruising level as specified in ICAO Annex 2 Appendix 3
- (d) Control areas, control zones and flight information zones should form part of that flight information region.

(b) CONTROL AREAS

- (1) Control areas shall be delineated so as to encompass sufficient airspace to contain the flight paths of those instrument flight rules (IFR) flights or portions thereof to which the applicable parts of the air traffic control (ATC) service are provided, taking into account the capabilities of the navigation aids normally used in that area.
- (2) A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft).

Note: The lower limit of a control area should be established at a greater height above the ground or water of not less than 200 m (700 ft), when practicable and desirable in order to allow freedom of action for VFR flights below the control area.

- (3) An upper limit of a control area shall be established when either:
 - (i) ATC service will not be provided above such upper limit; or

- (ii) the control area is situated below an upper control area, in which case, the upper limit shall coincide with the lower limit of the upper control area.

Note: When established, the upper limit of a control area should coincide with a VFR cruising level as specified in ICAO Annex 2 Appendix 3

Notes on CONTROL AREAS:

- (a) Whenever possible, a control area should be identified by the name of the unit having jurisdiction over such airspace.
- (b) Where it is desirable to limit the number of control areas through which high flying aircraft would otherwise have to operate, a control area should be delineated to include the upper airspace within the lateral limits of a number of lower control areas.
- (c) When the lower limit of a control area is above 900 m (3 000 ft) mean sea level (MSL), it should coincide with a VFR cruising level as specified in ICAO Annex 2 Appendix 3
- (d) In a given control area, the lower limit may be established non-uniformly (see Figure A-5 of the 'Air Traffic Services Planning Manual' (Doc 9426), Part I, Section 2, Chapter 3).
- (e) The selected VFR cruising level of the lower limit of a control area should be such that expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.
- (f) In a control area other than one formed by a system of airways, a system of routes may be established to facilitate the provision of air traffic control.

(c) CONTROL ZONES

- (1) The horizontal limits of a control zone shall encompass at least those portions of the airspace, which are not within control areas, that contains the paths of IFR flights arriving at and departing from aerodromes to be used under instrument meteorological conditions (IMC).

Note: The horizontal limits of a control zone should extend to at least 9.3 km (5 NM) from the centre of the aerodrome or aerodromes concerned in the directions from which approaches may be made

- (2) If located within the horizontal limits of a control area, the control zone shall extend upwards from the surface of the earth to at least the lower limit of the control area.

Notes on CONTROL ZONES:

- (a) Whenever possible, a control zone should be identified by the name of the unit having jurisdiction over such airspace.
- (b) If a control zone is located outside of the horizontal limits of a control area, an upper limit should be established.

- (c) An upper limit higher than the lower limit of the overlying control area may be established when desired.
- (d) If it is desired to establish the upper limit of a control zone at a level higher than the lower limit of the control area established above it, or if the control zone is located outside of the lateral limits of a control area, its upper limit should be established at a level which can easily be identified by pilots. When this limit is above 900 m (3 000 ft) MSL, it should coincide with a VFR cruising level as specified in ICAO Annex 2 Appendix 3
- (e) The selected VFR cruising level of the upper limit of a control zone should be such that the expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.
- (f) A control zone may include two or more aerodromes situated close together.
- (g) When designing the lateral limits of control zones, aircraft holding in the vicinity of aerodromes are considered as arriving aircraft.

SECTION II

Establishment and Identification of ATS Routes

- (a) When ATS routes are established, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes shall be provided.
- (b) ATS routes shall be identified through designators.

Controlled, advisory and uncontrolled ATS routes should be identified as follows:

- (a) The basic designator should consist of one letter of the alphabet followed by a number from 1 to 999.

Selection of the letter shall be made from those listed hereunder:

- (1) 'A', 'B', 'G', 'R' for routes, which form part of the regional networks of ATS routes and are not area navigation routes;
 - (2) 'L', 'M', 'N', 'P' for area navigation routes, which form part of the regional networks of ATS routes;
 - (3) 'W' for routes, which do not form part of the regional networks of ATS routes and are not area navigation routes; and
 - (4) 'Y' for area navigation routes, which do not form part of the regional networks of ATS routes.
- (b) The ATS route designator should consist of a basic designator supplemented, if necessary, by:

- (1) One prefix; where applicable, one supplementary letter may be added as a prefix to the basic designator in accordance with the following:
 - (i) 'K' to indicate a low-level route established for use primarily by helicopters;
 - (ii) 'U' to indicate that the route or portion thereof is established in the upper airspace; and
 - (iii) 'S' to indicate a route established exclusively for use by supersonic aircraft during acceleration, deceleration and while in supersonic flight;
- (2) One additional letter; When prescribed by CAAT or on the basis of regional air navigation agreements, a supplementary letter may be added after the basic designator of the ATS route in question in order to indicate the type of service provided in accordance with the following:
 - (i) 'F' to indicate that on the route or portion thereof only advisory service is provided;
 - (ii) 'G' to indicate that on the route or portion thereof only flight information service is provided.

Note: Due to limitations in the display equipment onboard aircraft, the supplementary letters 'F' or 'G', added after the basic designator of the ATS route to indicate the type of service provided, may not be displayed to the pilot.
- (c) The number of characters required to compose the designator should not exceed six.
- (d) The number of characters required to compose the designator should, whenever possible, be kept to a maximum of five.
- (c) When identifying navigation specifications and ATS routes other than standard departure and arrival routes, the designation system used shall:
 - (1) permit the identification of any ATS route in a simple and unique manner;
 - (2) avoid redundancy;
 - (3) be usable by both ground and airborne automation systems;
 - (4) permit utmost brevity in operational use; and
 - (5) provide for a sufficient possibility of extension to cater for any future requirements without the need for fundamental changes;
- (d) Basic ATS route designators shall be assigned in accordance with the following principles:
 - (1) the same basic designator shall be assigned to a main trunk route throughout its entire length, irrespective of terminal control areas, States or regions traversed;

- (2) where two or more trunk routes have a common segment, the segment in question shall be assigned each of the designators of the routes concerned, except where this would introduce difficulties in the provision of air traffic services (ATS), in which case, by common agreement, one designator only shall be assigned; and
- (3) a basic designator assigned to one route shall not be assigned to any other route.

Notes on SECTION II:

- (a) Guidance material relating to the establishment of ATS routes is contained in ICAO 'Air Traffic Services Planning Manual' (Doc 9426).
- (b) Guidance material relating to the establishment of ATS routes based on Performance-Based Navigation (PBN) is contained in ICAO 'Performance-based Navigation (PBN) Manual' (Doc 9613) and 'Manual on the Use of Performance-Based Navigation (PBN) in Airspace Design' (Doc 9992).
- (c) Guidance material on the establishment of ATS routes defined by VOR is contained in Attachment A to ICAO Annex 11.
- (d) Guidance material on the determination of safe spacing between adjacent ATS routes is contained in ICAO 'Manual on Airspace Planning Methodology for the Determination of Separation Minima' (Doc 9689)
- (e) The spacing between parallel tracks or between parallel ATS route centre lines based on PBN should depend upon the relevant navigation specification required.
- (f) When warranted by density, complexity or nature of the traffic, special routes should be established for use by low-level traffic, including helicopters operating to and from helidecks on the high seas. When determining the horizontal spacing between such routes, account should be taken of the navigational means available and the navigation equipment carried on helicopters' board.

SECTION III

Establishment and Identification of standard departure and standard arrival routes and associated procedures

- (a) When identifying standard departure and standard arrival routes and associated procedures, it shall be ensured that:
 - (1) the system of designators shall permit the identification of each route in a simple and unambiguous manner;

Note: When identifying standard departure and arrival routes and associated procedures, the system of designators permits the identification of each route in a simple and unambiguous manner. In doing so, the identification of each route should:

 - (a) makes a clear distinction between:
 - (1) departure routes and arrival routes;

- (2) departure or arrival routes and other ATS routes; and
 - (3) routes requiring navigation by reference to ground-based radio aids or self-contained airborne aids, and routes requiring navigation by visual reference to the ground;
- (b) is compatible with ATS and aircraft data processing and display requirements;
 - (c) is of utmost brevity in its operational application;
 - (d) avoids redundancy; and
 - (e) provides sufficient possibility for extension to cater for any future requirements without the need for fundamental changes.
- (2) each route shall be identified by a plain language designator and a corresponding coded designator;
- Note: A plain language designator of a standard departure or arrival route should consist of:
- (a) a basic indicator;
 - (b) followed by a validity indicator;
 - (c) followed by a route indicator, where required;
 - (d) followed by the word 'departure' or 'arrival';
 - (e) followed by the word 'visual', if the route has been established for use by aircraft operating in accordance with the visual flight rules (VFR) or in accordance with the IFR under VMC; and
- (3) in voice communications, the designators shall be easily recognisable as relating to a standard departure or standard arrival route and shall not create any difficulties in pronunciation for pilots and ATS personnel.
- (b) When composing designators for standard departure and standard arrival routes and associated procedures, the following shall be used:
- (1) a plain language designator;
 - (2) a basic indicator;
- Note: The basic indicator should be considered the name or name-code of the significant point where a standard departure route terminates, or a standard arrival route begins.
- (3) a validity indicator that shall be a number from 1 to 9;
 - (4) a route indicator that shall be one letter of the alphabet; the letters 'I' and 'O' shall not be used; and
 - (5) a coded designator of a standard departure or standard arrival route, instrument or visual.

Note: The coded designator of a standard departure or arrival route, instrument or visual, should consist of:

- (a) the coded designator or name-code of the significant point;
 - (b) followed by the validity indicator;
 - (c) followed by the route indicator, where required.
- (c) Assignment of designators
- (1) Each route shall be assigned a separate designator.
 - (2) To distinguish between two or more routes that relate to the same significant point (and are therefore assigned the same basic indicator), a separate route indicator as described in (b)(4) shall be assigned to each route.
- (d) Assignment of validity indicators
- (1) A validity indicator shall be assigned to each route to identify the route that is currently in effect.
 - (2) The first validity indicator to be assigned shall be the number '1'.
 - (3) Whenever a route is amended, a new validity indicator, which consists of the next higher number, shall be assigned. The number '9' shall be followed by the number '1'.

Notes on SECTION III:

- (a) Guidance material relating to the establishment of standard departure and arrival routes and associated procedures is contained in ICAO 'Air Traffic Services Planning Manual' (Doc 9426).
- (b) The flight procedure naming convention is contained in ICAO Doc 8168 (PANS-OPS) Volume II 'Construction of Visual and Instrument Flight Procedures', as last amended.
- (c) The plain language designator used for the phraseology is contained in ICAO Doc 4444 (PANS-ATM) 'Air Traffic Management', as last amended.
- (d) The runway designator detailed requirements are contained in ICAO Annex 14 Volume I, Section 5.2.2.
- (e) Examples of plain language and coded designators for standard departure and arrival routes and associated procedures:
 - (1) Example 1: Standard departure route — instrument:
Plain language designator: BRECON ONE DEPARTURE
Coded designator: BCN 1

Meaning: The designator identifies a standard instrument departure route which terminates at the significant point BRECON (basic indicator). BRECON is a radio navigation facility with

the identification BCN (basic indicator of the coded designator). The validity indicator ONE (1 in the coded designator) signifies either that the original version of the route is still in effect or that a change has been made from the previous version NINE (9) to the now effective version ONE (1) (see (d)(3)). The absence of a route indicator (see (b)(4) and (c)(2)) signifies that only one route, in this case a departure route, has been established with reference to BRECON.

- (2) Example 2: Standard arrival route — instrument:

Plain language designator: KODAP TWO ALPHA ARRIVAL

Coded designator: KODAP 2 A

Meaning: This designator identifies a standard instrument arrival route which begins at the significant point KODAP (basic indicator). KODAP is a significant point not marked by the site of a radio navigation facility and therefore assigned a five-letter name-code in accordance with Appendix 2 to Annex XI. The validity indicator TWO (2) signifies that a change has been made from the previous version ONE (1) to the now effective version TWO (2). The route indicator ALPHA (A) identifies one of several routes established with reference to KODAP and is a specific character assigned to this route.

- (3) Example 3: Standard departure route — visual:

Plain language designator: ADOLA FIVE BRAVO DEPARTURE VISUAL

Coded designator: ADOLA 5 B

Meaning: This designator identifies a standard departure route with visual portion of flight, which terminates at ADOLA, a significant point not marked by the site of a radio navigation facility. The validity indicator FIVE (5) signifies that a change has been made from the previous version FOUR (4) to the now effective version FIVE (5). The route indicator BRAVO (B) identifies one of several routes established with reference to ADOLA.

- (f) Examples of plain language and coded designators for approach procedures

- (1) Example 1: Instrument approach to a runway

Plain language designator: RNP ZULU APPROACH RUNWAY ONE EIGHT

Coded designator: RNP Z RWY18

Meaning: The designator identifies an RNAV approach procedure to runway 18. The suffix letter ZULU (Z) identifies one of several RNAV approaches established on runway 18 and is a specific character assigned to this procedure.

- (2) Example 2: Instrument approach to a runway

Plain language designator: ILS ZULU APPROACH RUNWAY THREE TWO

Coded designator: ILS Z RWY32

Meaning: The designator identifies an ILS approach procedure to runway 32. The suffix letter ZULU (Z) identifies one of several ILS approaches established on runway 32 and is a specific character assigned to this procedure.

- (3) Example 3: Instrument approach to a helipad

Plain language designator: RNP APPROACH TWO THREE TWO

Coded designator: RNP 232

Meaning: The designator identifies an RNAV approach procedure to a helipad for which the final approach track is equal to 232°. The absence of suffix letter signifies there is no other RNAV approach to this helipad with the same final approach track.

(4) Example 4: Visual approach to a runway

Plain language designator: VISUAL APPROACH RUNWAY ONE EIGHT LEFT

Coded designator: None

Meaning: The designator identifies a visual approach procedure to the runway 18L.

(g) In this section, the term 'route' is used in the meaning of 'route and associated procedures'.

SECTION IV

Establishment and identification of significant points

(a) Significant points shall be established for the purpose of defining an ATS route or flight procedure and/or in relation to the ATS requirements for information on the progress of aircraft in flight.

Notes:

- (i) The significant points should, whenever possible, be established with reference to ground-based or space-based radio navigation aids.
- (ii) Where such ground-based or space-based radio navigation aids do not exist, significant points should be established at a location, which can be determined by self-contained airborne navigation aids, or, where navigation by visual reference to the ground is to be affected, by visual observation.
- (iii) Specific points may be designated as 'transfer of control' points by agreement between adjacent air traffic control units or control positions concerned.

(b) Significant points shall be identified by designators.

Notes:

- (i) For the designator for a significant point marked by the site of a radio navigation aid:
 - (1) Plain language name for significant points marked by the site of a radio navigation aid
 - (i) Whenever practicable, significant points should be named with reference to an identifiable and preferably prominent geographical location.
 - (ii) In selecting a name for the significant point, care should be taken to ensure that the following conditions are met:

- A. the name should not create difficulties in pronunciation for pilots or ATS personnel when speaking in the language used in ATS communications. Where the name of a geographical location in the national language selected for designating a significant point gives rise to difficulties in pronunciation, an abbreviated or contracted version of this name, which retains as much of its geographical significance as possible, should be selected;

Example: FUERSTENFELDBRUCK = FURSTY

- B. the name should be easily recognizable in voice communications and should be free of ambiguity with those of other significant points in the same general area. In addition, the name should not create confusion with respect to other communications exchanged between air traffic services and pilots;
- C. the name should, if possible, consist of at least six letters and form two syllables and preferably not more than three;
- D. the selected name should be the same for both the significant point and the radio navigation aid marking it.

- (2) Composition of coded designators for significant points marked by the site of a radio navigation aid

- (i) The coded designator should be the same as the radio identification of the radio navigation aid. It should be so composed, if possible, as to facilitate association with the name of the point in plain language.
- (iii) Coded designators should not be duplicated within 1,100 km (600 NM) of the location of the radio navigation aid concerned, except as noted hereunder.
- (iv) Thailand's requirements for coded designators should be notified to the Regional Offices of ICAO for coordination

- (ii) For the designator for a significant point not marked by the site of a radio navigation aid:

- (1) Where a significant point is required at a position not marked by the site of a radio navigation aid, and is used for ATC purposes, it should be designated by a unique five-letter pronounceable 'name-code'. This name-code designator then serves both as the name as well as the coded designator of the significant point.
- (2) The name-code designator should be selected so as to avoid any difficulties in pronunciation by pilots or ATS personnel when speaking in the language used in ATS communications.

Examples: ADOLA, KODAP

- (3) The name-code designator should be easily recognisable in voice communications and should be free of ambiguity with those used for other significant points in the same general area.

- (4) The unique five-letter pronounceable name-code designator assigned to a significant point should not be assigned to any other significant point. When there is a need to relocate a significant point, a new name-code designator should be chosen. In cases when Thailand wishes to keep the allocation of specific name-codes for reuse at a different location, such name-codes should not be used until after a period of at least six months.
 - (5) Thailand's requirements for unique five-letter pronounceable name-code designators should be notified to the Regional Offices of ICAO for coordination.
 - (6) In areas where no system of fixed routes is established or where the routes followed by aircraft vary depending on operational considerations, significant points should be determined and reported in terms of World Geodetic System — 1984 (WGS-84) geographical coordinates, except that permanently established significant points serving as exit and/or entry points into such areas should be designated.
- (iii) For the significant points used for reporting purposes:
- (1) In order to permit the ATS Provider to obtain information regarding the progress of aircraft in flight, selected significant points may need to be designated as reporting points.
 - (2) In establishing such points, consideration should be given to the following factors:
 - (i) the type of air traffic services provided;
 - (ii) the amount of traffic normally encountered;
 - (iii) the accuracy with which aircraft are capable of adhering to the current flight plan;
 - (iv) the speed of the aircraft;
 - (v) the separation minima applied;
 - (vi) the complexity of the airspace structure;
 - (vii) the control method(s) employed;
 - (viii) the start or end of significant phases of a flight (climb, descent, change of direction, etc.);
 - (ix) transfer of control procedures;
 - (x) safety and search and rescue aspects;
 - (xi) the cockpit and air-ground communication workload.
 - (3) Reporting points should be established either as 'compulsory' or as 'on-request'.

- (4) In establishing 'compulsory' reporting points, the following principles should apply:
- (i) compulsory reporting points should be limited to the minimum necessary for the routine provision of information to air traffic services units on the progress of aircraft in flight, bearing in mind the need to keep cockpit and controller workload and air-ground communications load to a minimum;
 - (xii) the availability of a radio navigation aid at a location should not necessarily determine its designation as a compulsory reporting point;
 - (xiii) compulsory reporting points should not necessarily be established at flight information region or control area boundaries.
- (5) The designation of compulsory and on-request reporting points shall be reviewed regularly with a view to keeping the requirements for routine position reporting to the minimum necessary to ensure efficient air traffic services.

Notes on SECTION IV

- (a) When two radio navigation aids operating in different bands of the frequency spectrum are situated at the same location, their radio identifications are normally the same.
- (b) 'On-request' reporting points may be established in relation to the requirements of air traffic services for additional position reports when traffic conditions so demand.
- (c) The ICAO International Codes and Routes Designators (ICARD) system is used to manage the allocation of unique five-letter name codes (5LNC) for significant points. They are notified to the Regional Offices of ICAO for coordination and registration on the 'ICAO five-letter name codes and route designators (ICARD)' data base system.
- (d) Additional details on the use of the ICARD system and associated database can be found in the 'ICAO codes and route designators. Five-Letter Name-Codes. Guidelines'.

SECTION V

Minimum flight altitudes

- (a) Minimum flight altitudes shall be determined for each ATS route and control area and shall be provided for promulgation. These minimum flight altitudes shall provide a minimum obstacle clearance within the areas concerned.
- (b) An altitude determined and published for each segment of the route provides the required Minimum Obstacle clearance (MOC) above obstacles contained inside the obstacle clearance areas. Detailed obstacle clearance criteria are contained in PANS-OPS (Doc 8168), Volume II.

Notes on SECTION V

Procedure altitude should be considered as a specified altitude flown operationally at or above the minimum obstacle clearance altitude and established to accommodate a stabilized descent at a prescribed

descent gradient/angle in the intermediate or final approach segment.

SECTION VI

Identification and delineation of prohibited, restricted and danger areas

When prohibited areas, restricted areas or danger areas are established, upon initial establishment, they shall be given an identification, and full details shall be provided for promulgation

- (a) The identification shall be used to identify the area in all subsequent notifications pertaining to that area.
- (b) The identification shall be composed of a group of letters and figures as follows:
 - (1) nationality letters 'VT' for the location indicator assigned to Thailand;
 - (2) the letter 'P' for prohibited area, the letter 'R' for restricted area, and the letter 'D' for danger area as appropriate;
 - (3) a number, unduplicated within Thailand.
- (c) To avoid confusion, identification numbers shall not be reused for a period of at least one year after cancellation of the area to which they refer.
- (d) When a prohibited, restricted or danger area is established, the area should be as small as practicable and be contained within simple geometrical limits, so as to permit ease of reference by all concerned.